PRELIMINARY ASSESSMENT SCORE FOR MAUNABO SOLID WASTE DISPOSAL MAUNABO, PUERTO RICO UNDER THE REVISED HAZARDOUS RANKING SYSTEM

PUERTO RICO
ENVIRONMENTAL QUALITY BOARD
SUPERFUND PA/SI PROGRAM

OCTOBER 9, 1991

Prepared By

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Reviewed and Approved By

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PA/SI Section Chief

P. A. SCORESHEETS

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OMB Approval Number: 2050-0095
Approved for Use Through: 1/92

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION	
	State: PR	CERCLIS Number: PRD980512420
	CERCLIS Discovery Date: 05-01-81	

1. General Site Information

Name:		Street Address:			
MAUNABO SOLID WASTE DISPOSAL		PR 759, KM. 2.5, PALO SECO BARRIO			
City:	**State:**	**Zip Code:**	**County:**	**Co. Code:**	**Cong. Dist:**
MAUNABO	PR	00707		095	
Latitude:	**Longitude:**	**Approx. Area of Site:**		**Status of Site:**	
18° 0' 54.0"	66° 55' 25.0"	8 acres		Active	

2. Owner/Operator Information

Owner:			Operator:		
DEPT. OF MUNICIPAL PUBLIC WORKS			DEPT. OF MUNICIPAL PUBLIC WORKS		
Street Address:			**Street Address:**		
MAUNABO MUNICIPALITY			MAUNABO MUNICIPALITY		
City:			**City:**		
MAUNABO			MAUNABO		
State:	**Zip Code:**	**Telephone:**	**State:**	**Zip Code:**	**Telephone:**
PR	00707	(809) 861-3145	PR	00707	(809) 861-3145
Type of Ownership:			**How Initially Identified:**		
Municipal			Not Specified		

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POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION	
	State: PR	CERCLIS Number: PRD980512420
	CERCLIS Discovery Date: 05-01-81	

3. Site Evaluator Information

Name of Evaluator:	Agency/Organization:	Date Prepared:
YAMIRA L. RIVERA	ENVIRONMENTAL QUALITY BOARD	02-06-92

Street Address:	City:	State:
431 PONCE DE LEON AVE., HATO REY	SAN JUAN	PR

Name of EPA or State Agency Contact:	Telephone:
FRANCISCO CLAUDIO RIOS	(809) 767-8071

Street Address:	City:	State:
431 PONCE DE LEON AVE., HATO REY	SAN JUAN	PR

4. Site Disposition (for EPA use only)

Emergency Response/Removal Assessment Recommendation: No Date:	CERCLIS Recommendation: Other Expanded SI Date:	Signature: Name: Position:

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POTENTIAL HAZARDOUS

WASTE SITE

PRELIMINARY ASSESSMENT FORM

IDENTIFICATION

State:	CERCLIS Number:
PR	PRD980512420

CERCLIS Discovery Date: 05-01-81

5. General Site Characteristics

Predominant Land Uses Within 1 Mile of Site:
- Residential
- Agricultural

Site Setting:
- Rural

Years of Operation:
- Beginning Year: 1974
- Ending Year: 1974

Type of Site Operations:
- Municipal Landfill

Waste Generated:
- Offsite

Waste Deposition Authorized By: Present Owner

Waste Accessible to the Public
- Yes

Distance to Nearest Dwelling, School, or Workplace:
- 2231 Feet

6. Waste Characteristics Information

Source Type	Quantity	Tier
Landfill	7.66e+00 acres	A

Tier Legend
- C = Constituent
- W = Wastestream
- V = Volume
- A = Area

General Types of Waste:
- Metals
- Organics
- Inorganics
- Solvents
- Paints/Pigments
- Laboratory/Hospital Waste
- Construction/Demolition Waste
- Pesticides/Herbicides
- Acids/Bases
- Oily Waste
- Municipal Waste

Physical State of Waste as Deposited
- Solid
- Liquid
- Sludge
- Powder

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POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION	
	State: PR	CERCLIS Number: PRD980512420
	CERCLIS Discovery Date: 05-01-81	

7. Ground Water Pathway

Is Ground Water Used for Drinking Water Within 4 Miles:
Yes

Type of Ground Water Wells Within 4 Miles:
Municipal
Private

Depth to Shallowest Aquifer:
33 Feet

Karst Terrain/Aquifer Present:
No

Is There a Suspected Release to Ground Water:
Yes

Have Primary Target Drinking Water Wells Been Identified: Yes

Primary Target Population: 10584

Nearest Designated Wellhead Protection Area:
None within 4 Miles

List Secondary Target Population Served by Ground Water Withdrawn From:

0 - 1/4 Mile	0
>1/4 - 1/2 Mile	0
>1/2 - 1 Mile	0
>1 - 2 Miles	0
>2 - 3 Miles	0
>3 - 4 Miles	0
Total	0

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POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION	
	State: PR	CERCLIS Number: PRD980512420
	CERCLIS Discovery Date: 05-01-81	

8. Surface Water Pathway — Part 1 of 4

Type of Surface Water Draining Site and 15 Miles Downstream:	Shortest Overland Distance From Any Source to Surface Water:
River Ocean	1500 Feet 0.3 Miles
Is there a Suspected Release to Surface Water: Yes	Site is Located in: >100 yr - 500 yr floodpla

8. Surface Water Pathway — Part 2 of 4

Drinking Water Intakes Along the Surface Water Migration Path: No

Have Primary Target Drinking Water Intakes Been Identified: No

Secondary Target Drinking Water Intakes:
None

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POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION	
	State: PR	CERCLIS Number: PRD980512420
	CERCLIS Discovery Date: 05-01-81	

8. Surface Water Pathway — Part 3 of 4

Fisheries Located Along the Surface Water Migration Path: Yes

Have Primary Target Fisheries Been Identified: No

Secondary Target Fisheries:

Fishery Name	Water Body Type/Flow(cfs)
Maunabo River	small-moderate stream/ 10-100
Caribbean Sea	Coastal,ocean,Gr.Lakes

8. Surface Water Pathway — Part 4 of 4

Wetlands Located Along the Surface Water Migration Path? (y/n) No

Have Primary Target Wetlands Been Identified? (y/n) No

Secondary Target Wetlands:
None

Other Sensitive Environments Along the Surface Water Migration Path: No

Have Primary Target Sensitive Environments Been Identified: No

Secondary Target Sensitive Environments:
None

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POTENTIAL HAZARDOUS

WASTE SITE

PRELIMINARY ASSESSMENT FORM

IDENTIFICATION

State:	CERCLIS Number:
PR	PRD980512420

CERCLIS Discovery Date: 05-01-81

9. Soil Exposure Pathway

Are People Occupying Residences or Attending School or Daycare on or Within 200 Feet of Areas of Known or Suspected Contamination: No

Number of Workers Onsite: 1 - 100

Have Terrestrial Sensitive Environments Been Identified on or Within 200 Feet of Areas of Known or Suspected Contamination: No

10. Air Pathway

Total Population on or Within:	
Onsite	3
0 - 1/4 Mile	192
>1/4 - 1/2 Mile	385
>1/2 - 1 Mile	1460
>1 - 2 Miles	3794
>2 - 3 Miles	10130
>3 - 4 Miles	8217
Total	24181

Is There a Suspected Release to Air: No

Wetlands Located Within 4 Miles of the Site: No

Other Sensitive Environments Located Within 4 Miles of the Site: No

Sensitive Environments Within 1/2 Mile of the Site:
None

OMB Approval Number: 2050-0095
Approved for Use Through: 1/92

PA-Score

PA ScoreSheets

Site Name: MAUNABO SOLID WASTE DISPOSAL
CERCLIS ID No.: PRD980512420
Street Address: PR 759, KM. 2.5, PALO SECO BARRIO
City/State/Zip: MAUNABO, PR 00707

Investigator: YAMIRA L. RIVERA
Agency/Organization: ENVIRONMENTAL QUALITY BOARD
Street Address: 431 PONCE DE LEON AVE., HATO REY
City/State: SAN JUAN, PR

Date: 02-06-92

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s0B WASTE CHARACTERISTICS

Waste Characteristics (WC) Calculations:

1 MAUNABO SWD UNIT	Landfill	Ref: 1	WQ value	maximum
Area	7.66E+00 acres		9.82E+01	9.82E+01

Since no specific source could be determined at this landfill from past operationsm, it was decided to consider the whole site as a source. There is no evidence in the available information of current or former hazardous waste disposal at the site. During the site inspection performed by NUS, three semivolatiles compounds were detected in soils, as well as phenol, butylbenzyl phthalate, bis(2-ethylhexyl)phthalate, PCB Aroclor-1248, lead, zinc, Ref: 1

Waste Characteristics Score: WC = 18

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Ground Water Pathway Criteria List
Suspected Release

Are sources poorly contained? (y/n/u)	Y
Is the source a type likely to contribute to ground water contamination (e.g., wet lagoon)? (y/n/u)	Y
Is waste quantity particularly large? (y/n/u)	Y
Is precipitation heavy? (y/n/u)	Y
Is the infiltration rate high? (y/n/u)	Y
Is the site located in an area of karst terrain? (y/n)	N
Is the subsurface highly permeable or conductive? (y/n/u)	Y
Is drinking water drawn from a shallow aquifer? (y/n/u)	Y
Are suspected contaminants highly mobile in ground water? (y/n/u)	U
Does analytical or circumstantial evidence suggest ground water contamination? (y/n/u)	N
Other criteria? (y/n)	N
SUSPECTED RELEASE? (y/n)	Y

Summarize the rationale for Suspected Release:

If there are hazardous wastes in the landfill, there is a high potential for groundwater contamination. The cover material, which is the same coarse sandy material that underlies the site is highly permeable and during rainstorms waste may be transported off site via surface runoff or seepage. The water table can be found at 33 feet below ground surface.

Ref: 1, 2

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Ground Water Pathway Criteria List
Primary Targets

Is any drinking water well nearby? (y/n/u)	Y
Has any nearby drinking water well been closed? (y/n/u)	N
Has any nearby drinking water well user reported foul-testing or foul-smelling water? (y/n/u)	U
Does any nearby well have a large drawdown/high production rate? (y/n/u)	Y
Is any drinking water well located between the site and other wells that are suspected to be exposed to a hazardous substance? (y/n/u)	Y
Does analytical or circumstantial evidence suggest contamination at a drinking water well? (y/n/u)	N
Does any drinking water well warrant sampling? (y/n/u)	Y
Other criteria? (y/n)	N
PRIMARY TARGET(S) IDENTIFIED? (y/n)	Y

Summarize the rationale for Primary Targets:

The closest well is found at approximately one mile to the southeast of the site. The aquifer in the Rio Maunabo drainage basin consists of alluvium deposits as thick as 200 feet of sand, silt, clay,and gravel. The average pemeability of these deposits is greater than 10 E-03 cm/sec. The water table can be found at a depth of approximately 33 feet from the ground surface. The cover material used at the landfill is highly permeable as well as the material that underlies the site (they are the same material). The landfill has been cited for allowing leachate to flow through the system due to loose cover material.

Ref: 1, 2

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s0B GROUND WATER PATHWAY SCORESHEETS

Pathway Characteristics

		Ref.
Do you suspect a release? (y/n)	Yes	
Is the site located in karst terrain? (y/n)	No	1, 2
Depth to aquifer (feet):	33	1, 2
Distance to the nearest drinking water well (feet):	5280	1

LIKELIHOOD OF RELEASE	Suspected Release	No Suspected Release	References
1. SUSPECTED RELEASE	550		
2. NO SUSPECTED RELEASE		0	
LR =	550	0	

Targets

TARGETS	Suspected Release	No Suspected Release	References
3. PRIMARY TARGET POPULATION 10584 person(s)	105840		
4. SECONDARY TARGET POPULATION Are any wells part of a blended system? (y/n) Y	0	0	
5. NEAREST WELL	50	0	
6. WELLHEAD PROTECTION AREA None within 4 Miles	0	0	
7. RESOURCES	5	0	
T =	105895	0	

WASTE CHARACTERISTICS

WC =	32	0

GROUND WATER PATHWAY SCORE: 100

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s0B Ground Water Target Populations

Primary Target Population Drinking Water Well ID	Dist. (miles)	Population Served	Reference	Value
1 Calzada	1.00	3528	1,4,6	35280
2 Bordaleza	2.00	3528	1,4,6	35280
3 San Pedro	1.80	3528	1, 4	35280
None				
			Total	105840

Secondary Target Population Distance Categories	Population Served	Reference	Value
0 to 1/4 mile	0	1	0
Greater than 1/4 to 1/2 mile	0	1	0
Greater than 1/2 to 1 mile	0	1	0
Greater than 1 to 2 miles	0	1	0
Greater than 2 to 3 miles	0	1	0
Greater than 3 to 4 miles	0	1	0
		Total	0

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0B Apportionment Documentation for a Blended System

There are only three wells downstream the site and they are all blended to serve the urban population of Maunabo. No surface water is blended with this system. Therefore, the downstream population was considered primary target due to the potential contamination of one of the wells.

Ref: 1, 6, 7

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Surface Water Pathway Criteria List
Suspected Release

Is surface water nearby? (y/n/u)	Y
Is waste quantity particularly large? (y/n/u)	Y
Is the drainage area large? (y/n/u)	Y
Is rainfall heavy? (y/n/u)	Y
Is the infiltration rate low? (y/n/u)	N
Are sources poorly contained or prone to runoff or flooding? (y/n/u)	Y
Is a runoff route well defined(e.g.ditch/channel to surf.water)? (y/n/u)	U
Is vegetation stressed along the probable runoff path? (y/n/u)	U
Are sediments or water unnaturally discolored? (y/n/u)	U
Is wildlife unnaturally absent? (y/n/u)	U
Has deposition of waste into surface water been observed? (y/n/u)	U
Is ground water discharge to surface water likely? (y/n/u)	Y
Does analytical/circumstantial evidence suggest S.W. contam? (y/n/u)	U
Other criteria? (y/n)	N
SUSPECTED RELEASE? (y/n)	Y

Summarize the rationale for Suspected Release:

The landfill sits adjacent to the floodplain of Rio Maunabo which has a drainage area of 12.4 square miles and is found at approximately 1500 feet from the site. The overall site slope is estimated to be about 5 percent toward the fields found to the east, south, and west which are lying almost flat on the Rio Maunabo floodplain with an estimated slope of less than 1 percent. The landfill has erosion problems, and loose cover material together with exposed garbage could lead to contaminant migration via surface runoff.

Ref: 1, 3, 4

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Surface Water Pathway Criteria List
Primary Targets

Is any target nearby? (y/n/u) If yes: **Y**

- **N** Drinking water intake
- **Y** Fishery
- N ~~Y~~ Sensitive environment

Has any intake, fishery, or recreational area been closed? (y/n/u) **N**

Does analytical or circumstantial evidence suggest surface water contamination at or downstream of a target? (y/n/u) **N**

Does any target warrant sampling? (y/n/u) If yes: **N**

- **N** Drinking water intake
- **N** Fishery
- **N** Sensitive environment

Other criteria? (y/n) **N**

PRIMARY INTAKE(S) IDENTIFIED? (y/n) **N**

Summarize the rationale for Primary Intakes:

The are no intakes located within 15 downstream miles from the site.

Ref: 1

continued -------

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continued -------

Other criteria? (y/n) N

PRIMARY FISHERY(IES) IDENTIFIED? (y/n) N

Summarize the rationale for Primary Fisheries:

There are no primary fisheries found within 15 downstream miles from the site.

Ref: 1

Other criteria? (y/n) N

PRIMARY SENSITIVE ENVIRONMENT(S) IDENTIFIED? (y/n) N

Summarize the rationale for Primary Sensitive Environments:

There are no sensitive environments within 2 miles of the site.

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SURFACE WATER PATHWAY SCORESHEETS

Pathway Characteristics		Ref.
Do you suspect a release? (y/n)	Yes	
Distance to surface water (feet):	1500	1
Flood frequency (years):	500	5
What is the downstream distance (miles) to:		
a. the nearest drinking water intake?	N.A.	1, 8
b. the nearest fishery?	0.3	1
c. the nearest sensitive environment?	N.A.	1

LIKELIHOOD OF RELEASE	Suspected Release	No Suspected Release	References
1. SUSPECTED RELEASE	550		
2. NO SUSPECTED RELEASE		0	
LR =	550	0	

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s0B Drinking Water Threat Targets

TARGETS	Suspected Release	No Suspected Release	References
3. Determine the water body type, flow (if applicable), and number of people served by each drinking water intake.			
4. PRIMARY TARGET POPULATION 0 person(s)	0		
5. SECONDARY TARGET POPULATION Are any intakes part of a blended system? (y/n): N	0	0	
6. NEAREST INTAKE	0	0	
7. RESOURCES	5	0	
T =	5	0	

Drinking Water Threat Target Populations

Intake Name	Primary (y/n)	Water Body Type/Flow	Population Served	Ref.	Value
None					

Total Primary Target Population Value	0
Total Secondary Target Population Value	0

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s0B Apportionment Documentation for a Blended System

There are no intakes located downstream the site and none are part of the urban system which serves the downstream population.

Ref: 1

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s0B Human Food Chain Threat Targets

TARGETS	Suspected Release	No Suspected Release	References
8. Determine the water body type and flow for each fishery within the target limit.			
9. PRIMARY FISHERIES	0		
10. SECONDARY FISHERIES	210	0	
T =	210	0	

Human Food Chain Threat Targets

Fishery Name	Primary (y/n)	Water Body Type/Flow	Ref.	Value
1 Maunabo River	N	10-100 cfs	4	30
2 Caribbean Sea	N	Coastal,ocean,Gr.Lake	4	12
None				

Total Primary Fisheries Value	0
Total Secondary Fisheries Value	42

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s0B Environmental Threat Targets

TARGETS	Suspected Release	No Suspected Release	References
11. Determine the water body type and flow (if applicable) for each sensitive environment.			
12. PRIMARY SENSITIVE ENVIRONMENTS	0		
13. SECONDARY SENSITIVE ENVIRONS.	0	0	
T =	0	0	

Environmental Threat Targets

Sensitive Environment Name	Primary (y/n)	Water Body Type/Flow	Ref.	Value
None				

Total Primary Sensitive Environments Value	0
Total Secondary Sensitive Environments Value	0

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s0B Surface Water Pathway Threat Scores

Threat	Likelihood of Release(LR) Score	Targets(T) Score	Pathway Waste Characteristics (WC) Score	Threat Score LR x T x WC / 82,500
Drinking Water	550	5	18	1
Human Food Chain	550	210	18	25
Environmental	550	0	18	0

SURFACE WATER PATHWAY SCORE: 26

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Soil Exposure Pathway Criteria List
Resident Population

Is any residence, school, or daycare facility on or within 200 feet of an area of suspected contamination? (y/n/u)	N
Is any residence, school, or daycare facility located on adjacent land previously owned or leased by the site owner/operator? (y/n/u)	N
Is there a migration route that might spread hazardous substances near residences, schools, or daycare facilities? (y/n/u)	N
Have onsite or adjacent residents or students reported adverse health effects, exclusive of apparent drinking water or air contamination problems? (y/n/u)	U
Does any neighboring property warrant sampling? (y/n/u)	Y

Other criteria? (y/n) N

RESIDENT POPULATION IDENTIFIED? (y/n) N

Summarize the rationale for Resident Population:

The nearest residences are found at 0.1 mile north of the site entrance.

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SOIL EXPOSURE PATHWAY SCORESHEETS

Pathway Characteristics

		Ref.
Do any people live on or within 200 ft of areas of suspected contamination? (y/n)	No	1
Do any people attend school or daycare on or within 200 ft of areas of suspected contamination? (y/n)	No	1, 9
Is the facility active? (y/n):	Yes	1

LIKELIHOOD OF EXPOSURE	Suspected Contamination	References
1. SUSPECTED CONTAMINATION LE =	550	

Targets

2. RESIDENT POPULATION 0 resident(s) 0 school/daycare student(s)	0	1
3. RESIDENT INDIVIDUAL	0	
4. WORKERS 1 - 100	5	1
5. TERRES. SENSITIVE ENVIRONMENTS	0	
6. RESOURCES	5	
T =	10	

WASTE CHARACTERISTICS

WC = 18

RESIDENT POPULATION THREAT SCORE: 1

NEARBY POPULATION THREAT SCORE: 1

Population Within 1 Mile: 1 - 10,000

SOIL EXPOSURE PATHWAY SCORE: 2

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s0B Soil Exposure Pathway Terrestrial Sensitive Environments

Terrestrial Sensitive Environment Name	Reference	Value
None		
Total Terrestrial Sensitive Environments Value		

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Air Pathway Criteria List
Suspected Release

Are odors currently reported? (y/n/u)	U
Has release of a hazardous substance to the air been directly observed? (y/n/u)	N
Are there reports of adverse health effects (e.g., headaches, nausea, dizziness) potentially resulting from migration of hazardous substances through the air? (y/n/u)	U
Does analytical/circumstantial evidence suggest release to air? (y/n/u)	N
Other criteria? (y/n)	N
SUSPECTED RELEASE? (y/n)	N

Summarize the rationale for Suspected Release:

Readings above background of methane were detected on the HNu photoionization detector near a drum in the northeast corner of the landfill and about 20 feet north of a soil sample. There were no readings above background in the ambient air near the drum. There is no evidence in the available information of wastes or receipt of hazardous wastes at the landfill.

Ref: 1

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AIR PATHWAY SCORESHEETS

Pathway Characteristics

		Ref.
Do you suspect a release? (y/n)	No	
Distance to the nearest individual (feet):	0	1

LIKELIHOOD OF RELEASE	Suspected Release	No Suspected Release	References
1. SUSPECTED RELEASE	0		
2. NO SUSPECTED RELEASE		500	
LR =	0	500	

Targets

TARGETS	Suspected Release	No Suspected Release	References
3. PRIMARY TARGET POPULATION 0 person(s)	0		
4. SECONDARY TARGET POPULATION	0	19	
5. NEAREST INDIVIDUAL	0	20	
6. PRIMARY SENSITIVE ENVIRONS.	0		
7. SECONDARY SENSITIVE ENVIRONS.	0	0	
8. RESOURCES	0	5	
T =	0	44	

WASTE CHARACTERISTICS

WC =	0	18

AIR PATHWAY SCORE:	5

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s0B Air Pathway Secondary Target Populations

Distance Categories	Population	References	Value
Onsite	3	1, 9	1
Greater than 0 to 1/4 mile	192	1, 9	4
Greater than 1/4 to 1/2 mile	385	1, 9	3
Greater than 1/2 to 1 mile	1460	1, 9	3
Greater than 1 to 2 miles	3794	1, 9	3
Greater than 2 to 3 miles	10130	1, 9	4
Greater than 3 to 4 miles	8217	1, 9	1
		Total Secondary Population Value	19

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s0B Air Pathway Primary Sensitive Environments

Sensitive Environment Name	Reference	Value
None		
Total Primary Sensitive Environments Value		

Air Pathway Secondary Sensitive Environments

Sensitive Environment Name	Distance	Reference	Value
None			
Total Secondary Sensitive Environments Value			

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SITE SCORE CALCULATION	SCORE
GROUND WATER PATHWAY SCORE:	100
SURFACE WATER PATHWAY SCORE:	26
SOIL EXPOSURE PATHWAY SCORE:	2
AIR PATHWAY SCORE:	5
SITE SCORE:	52

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SUMMARY

1. Is there a high possibility of a threat to any nearby drinking water well(s) by migration of a hazardous substance in ground water? Yes

   If yes, identify the well(s).

   Calzada Well (Maunabo 3)

   If yes, how many people are served by the threatened well(s)? 192

2. Is there a high possibility of a threat to any of the following by hazardous substance migration in surface water?
   A. Drinking water intake — No
   B. Fishery — Yes
   C. Sensitive environment (wetland, critical habitat, others) — No

   If yes, identity the target(s).
   Maunabo River

3. Is there a high possibility of an area of surficial contamination within 200 feet of any residence, school, or daycare facility? No

   If yes, identify the properties and estimate the associated population(s)

4. Are there public health concerns at this site that are not addressed by PA scoring considerations? No

   If yes, explain:

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REFERENCE LIST

1. Site Inspection Report, NUS Corporation, Superfund Division, June 27, 1989, PRD 980512420

2. C.L. Rogers, C.M. Cram, M. H. Pease, Jr., and M.S. Tischler, United States Geological Survey, Geologic Map of the Yabucoa and Punta Tuna Quadrangles, Puerto Rico, Map I-1086, 1979

3. R.E. Curtis, Z. Aquino, P.L. Diaz, and R.J. Vachier, "Water Resources Data Puerto Rico and the U.S. Virgin Islands Water Year 1990", U.S. Geological Survey Water-Data Report PR-90-1.

4. U.S. Geological Survey, Water Resources Division, San Juan, Puerto Rico, Report on Water Use for 1983.

5. Commonwealth of Puerto Rico, Flood Insurance Rate Map, Federal Emergency Management Agency, Panel 250 of 325; 720000 0250 B, Map Revised July 2, 1981

6. Maria del Carmen Huertas, PRASA Supervisor from Guayama Region, telephone conversation with Yamira L. Rivera, EQB, February 13, 1992. RE: Maunabo Water Supply

7. Guidance for Performing Preliminary Assessments Under CERCLA, U.S. Environmental Protection Agency Publication 9345.0-01A, Washington, D.C. September 1991

8. Commonwealth of Puerto Rico, Aqueduct and Sewer Authority, Water Supply Systems Maps - Yabucoa and Punta Tunas, Maps No. 55 and 56 January 1983

REFERENCE 1

02-8811-24-SI
REV. NO. 0

FINAL DRAFT
SITE INSPECTION REPORT
MAUNABO SOLID WASTE DISPOSAL
MAUNABO, PUERTO RICO

PREPARED UNDER
TECHNICAL DIRECTIVE DOCUMENT NO. 02-8811-24
CONTRACT NO. 68-01-7346

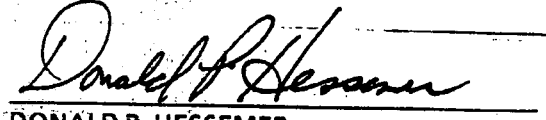
FOR THE

ENVIRONMENTAL SERVICES DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

JUNE 27, 1989

NUS CORPORATION
SUPERFUND DIVISION

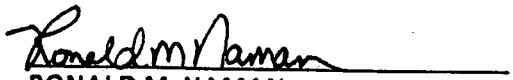
SUBMITTED BY:



DONALD P. HESSEMER
PROJECT MANAGER

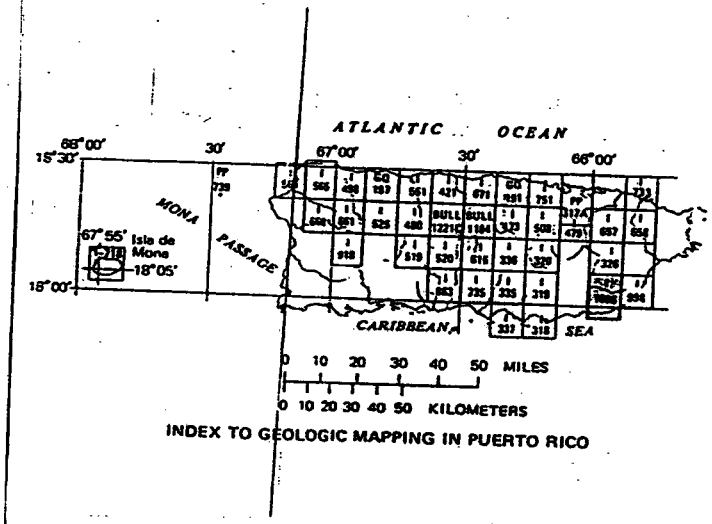
GERALD V. GILLILAND
SITE MANAGER

REVIEWED/APPROVED BY:



RONALD M. NAMAN
FIT OFFICE MANAGER

REFERENCE 2



INDEX TO GEOLOGIC MAPPING IN PUERTO RICO

GEOLOGIC MAP OF THE YAPUCOA AND PUNTA TUNA QUADRANGLES, PUERTO RICO

By

C. L. Rogers, C. M. Cram, M. H. Pease, Jr., and M. S. Tischler

1979

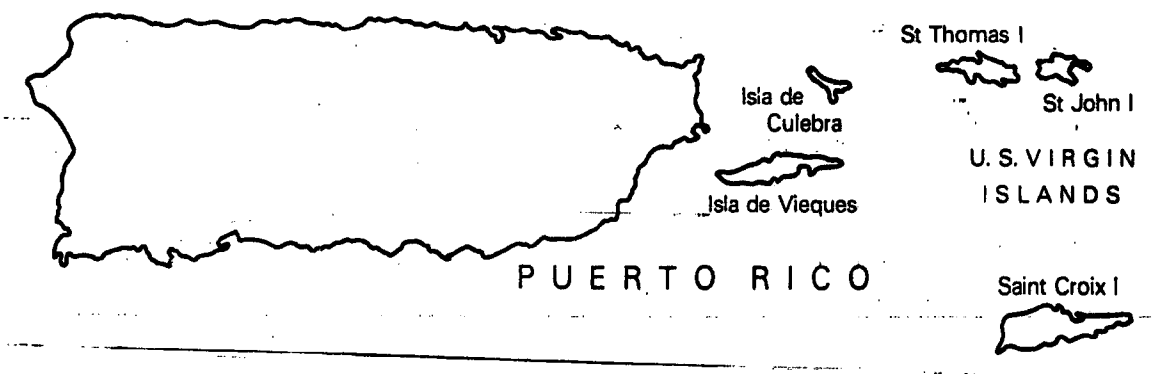

Río
Qaf
Garona
Escuela Segunda Unidad
Quebrada
Qaf
Kgr
Maunabo
Maunabo
Columbia
Qaf
759
PALO SECO
TALANTE
Kgr

REFERENCE 3

Water Resources Data Puerto Rico and the U.S. Virgin Islands

Water Year 1990

by R.E. Curtis, Jr., Z. Aquino, P.L. Diaz, and R.J. Vachier



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT PR-90-1
Prepared in cooperation with the Commonwealth of Puerto Rico, the Government of the U.S. Virgin Islands, and other agencies

RIO MAUNABO BASIN

50091000 RIO MAUNABO AT MAUNABO, PR

WATER-QUALITY RECORDS

LOCATION.--Lat 18°00'24", long 65°54'19", at bridge on Highway 3, 0.4 mi (0.6 km) southwest of Maunabo plaza, and 1.3 mi (2.1 km) upstream from mouth.

DRAINAGE AREA.--12.4 mi² (32.1 km²).

PERIOD OF RECORD.--Water years 1958-66, 1975 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND	SPECIFIC CONDUCTANCE (US/CM)	PH (STANDARD UNITS)	TEMPERATURE WATER (DEG C)	TURBIDITY (NTU)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	OXYGEN DEMAND, CHEMICAL (HIGH LEVEL) (MG/L)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT 1989											
24...	0920	21	250	7.30	25.0	2.7	7.6	91	20	2600	420
DEC											
13...	0825	10	281	7.40	22.0	32	7.5	84	13	K1300	530
FEB 1990											
12...	0910	12	250	7.10	23.0	1.0	7.0	80	29	590	380
APR											
24...	0940	2.7	455	7.40	26.0	30	7.2	88	18	K1100	320
JUN											
13...	0955	2.3	402	7.20	29.0	50	7.1	90	18	K1400	350
AUG											
13...	1050	40	188	7.60	28.0	75	6.7	84	30	35000	24000

DATE	HARDNESS TOTAL (MG/L AS CACO3)	HARDNESS NONCARB WH WAT TOT FLD MG/L AS CACO3	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3	SULFIDE TOTAL (MG/L AS S)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
OCT 1989											
24...	73	0	18	6.9	20	1	1.3	80	<0.5	10	16
DEC											
13...	--	--	--	--	--	--	--	95	--	--	--
FEB 1990											
12...	--	--	--	--	--	--	--	87	--	--	--
APR											
24...	130	0	31	13	41	2	3.9	88	<0.5	24	52
JUN											
13...	--	--	--	--	--	--	--	100	--	--	--
AUG											
13...	56	0	13	5.6	17	1	2.0	59	--	7.8	19

DATE	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	RESIDUE TOTAL AT 105 DEG. C, SUSPENDED (MG/L)	NITROGEN, NITRATE TOTAL (MG/L AS N)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)
OCT 1989										
24...	0.10	39	159	9.12	17	0.39	0.01	0.40	0.03	0.47
DEC										
13...	--	--	--	--	56	0.28	0.02	0.30	1.0	0.50
FEB 1990										
12...	--	--	--	--	5	0.19	0.01	0.20	0.02	0.48
APR										
24...	0.30	45	280	2.02	89	1.67	0.13	1.8	0.96	0.34
JUN										
13...	--	--	--	--	61	0.28	0.12	0.40	0.84	0.46
AUG										
13...	<0.10	28	128	14.1	130	0.37	0.03	0.40	0.04	2.3

K = non-ideal count

50091000 RIO MAUNABO AT MAUNABO, PR--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS TOTAL (MG/L AS P)	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)
OCT 1989										
24...	0.50	0.90	4.0	0.07	<1	<100	30	<1	<1	<10
DEC										
13...	1.5	1.8	8.0	0.24	--	--	--	--	--	--
FEB 1990										
12...	0.50	0.70	3.1	0.16	--	--	--	--	--	--
APR										
24...	1.3	3.1	14	1.6	1	100	40	<1	<1	<10
JUN										
13...	1.3	1.7	7.5	0.81	--	--	--	--	--	--
AUG										
13...	2.3	2.7	12	0.11	--	--	--	--	--	--

DATE	IRON, TOTAL RECOVERABLE (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS TOTAL (UG/L)	METHYLENE BLUE ACTIVE SUBSTANCE (MG/L)
OCT 1989										
24...	790	4	60	<0.10	<1	<1	<10	<0.010	<1	0.03
DEC										
13...	--	--	--	--	--	--	--	--	--	--
FEB 1990										
12...	--	--	--	--	--	--	--	--	--	--
APR										
24...	4700	1	230	<0.10	<1	<1	20	<0.010	<1	0.12
JUN										
13...	--	--	--	--	--	--	--	--	--	--
AUG										
13...	--	--	--	--	--	--	--	--	--	--

REFERENCE 4

FILTER PLANTS

US GEOLOGICAL SURVEY
WATER RESOURCES DIVISION, SAN JUAN, PR
REPORT ON WATER USE FOR YEAR 1983

MAUNABO

WELLS

CAT	STATION NAME	LATITUDE	LONGITUDE	ANNUAL AMOUNT (MILLION GALLONS)
	POZO 1 (MAUNABO)	180010	0655546	60.0
	POZO 4 (URB. SAN PEDRO)	180013	0655321	62.5
	CALZADA	180013	0655355	100.0

SURFACE WATER PRODUCTION FACILITIES

FACILITY NAME	LATITUDE	LONGITUDE	ANNUAL AMOUNT (MILLION GALLONS)
MATUYAS-MAUNABO	180235	0655803	26.3

QUALITY OF WATER OF SELECTED WELLS AND SURFACE WATER SITES

GROUND WATER

FACILITY NAME	DATE	pH	COLOR	TUR	Ca	Mg	Na	K	CaCO3	SO4	Cl	F	SiO2	TDS	NO3-N	Fe	Mn
POZO 1 (MAUNABO)	11/09/81	7.1	0	0.3	49	23.0	55.0	1.2	202	71.0	41.0	0.0	40.0	438	2.50	0.14	0.00

SURFACE WATER

FACILITY NAME	DATE	pH	COLOR	TUR	Ca	Mg	Na	K	CaCO3	SO4	Cl	F	SiO2	TDS	NO3-N	Fe	Mn
MATUYAS-MAUNABO	11/24/81	7.7	0	0.7	27	0.6	16.0	0.2	59	19.0	19.0	0.3	34.0	214	0.30	0.13	0.00

FILTER PLANTS

US GEOLOGICAL SURVEY
WATER RESOURCES DIVISION, SAN JUAN, PR
REPORT ON WATER USE FOR YEAR 1983

MAYAGUEZ

WELLS

FACILITY NAME	LATITUDE	LONGITUDE	ANNUAL AMOUNT (MILLION GALLONS)
MARINI 1	181251	0670527	66.6
MARINI 2	181224	0670427	35.2
MARINI 3			0.0
ROSARIO 3	180352	0670517	42.1

SURFACE WATER PRODUCTION FACILITIES

FACILITY NAME	LATITUDE	LONGITUDE	ANNUAL AMOUNT

REFERENCE 5

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

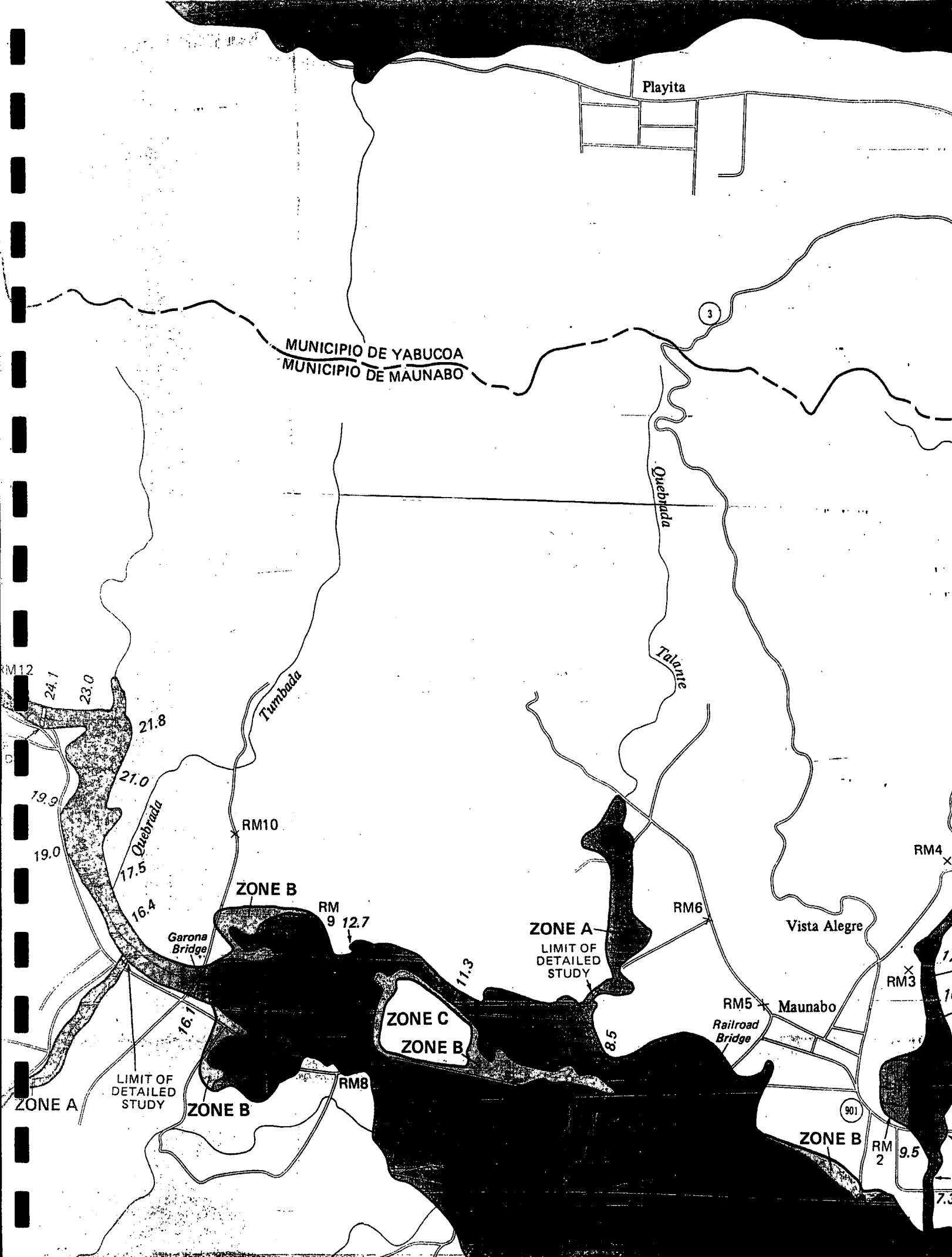
COMMONWEALTH OF PUERTO RICO

COMMUNITY-PANEL NUMBER
720000 0250 B

PANEL 250 OF 325
(SEE MAP INDEX FOR PANELS NOT PRINTED)

MAP REVISED:
JULY 2, 1981

Federal Emergency Management Agency


Playita
3
MUNICIPIO DE YABUCOA
MUNICIPIO DE MAUNABO
Quebrada
Talante
Tumbada
RM12
24.1
23.0
21.8
21.0
19.9
19.0
17.5
16.4
Quebrada
RM10
ZONE B
RM 9 12.7
Garona Bridge
ZONE A
LIMIT OF DETAILED STUDY
11.3
ZONE C
ZONE B
8.5
RM6
RM4
Vista Alegre
RM3
RM5
Maunabo
Railroad Bridge
16.1
LIMIT OF DETAILED STUDY
ZONE A
ZONE B
RM8
901
ZONE B
RM 2
9.5

REFERENCE 6

PR ENVIRONMENTAL QUALITY BOARD		Ref. 6
SUPERFUND PA/SI PROGRAM		TELECON NOTE
CONTROL NO: PRD980512420	DATE: February 13, 1992	TIME: 10:55 a.m.
DISTRIBUTION:		
BETWEEN: Maria del Carmen Huertas	OF: PRASA Guayama Region	PHONE: (809) 864-3136
AND: Yamira L. Rivera, Environmental Quality Board		

DISCUSSION:

Ms. Huertas informed that the Municipality of Maunabo is served by a urban system and a rural system. The urban system consists of three wells blended to serve the town of Maunabo. They are: Calzada, Bordaleza, and San Pedro. The total population served by these wells is approximately 10,584 persons.

The rural system serves a total of 1,036 persons and consists of the Matuya Plant.

REFERENCE 7

EPA/540/G-91/013
Publication 9345.0-01A
September 1991

Guidance for Performing Preliminary Assessments Under CERCLA

Hazardous Site Evaluation Division
Office of Emergency and Remedial Response
Office of Solid Waste and Emergency Response
U.S. Environmental Protection Agency
Washington, DC 20460

REFERENCE 8

COMMONWEALTH OF PUERTO RICO

AQUEDUCT AND SEWER AUTHORITY

WATER SUPPLY SYSTEMS MAP

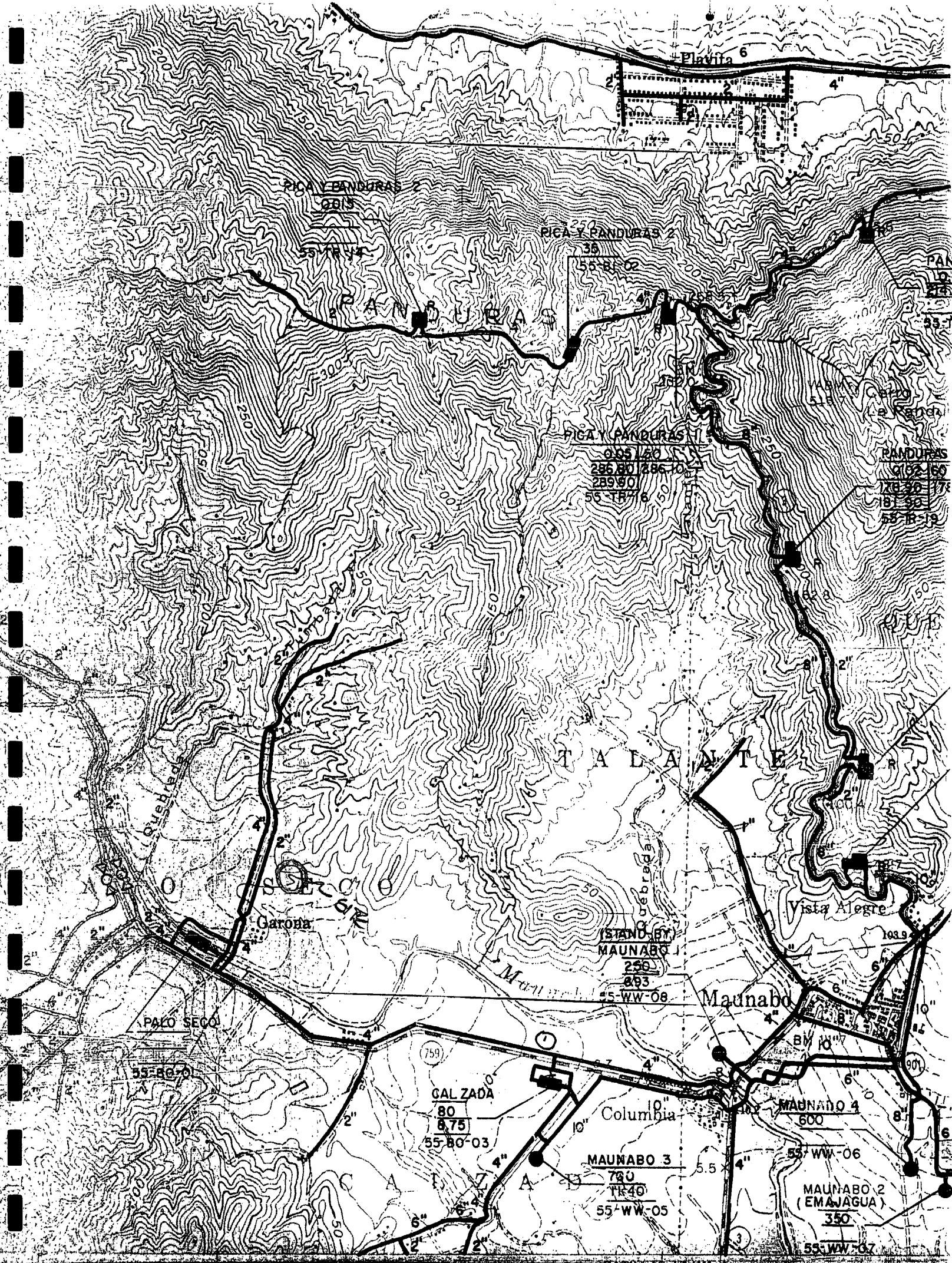
YABUCOA

DATE: JAN. 1983

MAP NUMBER: 55

Santiago Vázquez
Flaherty • Giavara
SVFG
403 PARQUE STREET. SAN JUAN. PUERTO RICO 809/728-2323. 728-2324

Estado Libre Asociado de Puerto Rico
AUTORIDAD DE ACUEDUCTOS Y ALCANTARILLADOS


Playita
PICA Y PANDURAS 2
0015
55-TR-14
PICA Y PANDURAS 2
35
55-BI-02
PANDURAS
PICA Y PANDURAS 1
0.05 | 50
286.80 | 286.10
289.90
55-TR-16
PANDURAS
0102-150
178.30
181.90
55-TR-19
Cerro
La Renda
Quebrada
Garona
PALO SECO
55-BO-01
(STAND-BY)
MAUNABO 1
250
893
55-WW-08
Maunabo
Vista Alegre
CALZADA
80
8.75
55-BO-03
MAUNABO 3
780
11.40
55-WW-05
Columbia
MAUNABO 4
600
55-WW-06
MAUNABO 2
(EMAJAGUA)
350
55-WW-07
759
901